

SUMMARY

Physico-chemical properties

1. Polyethylene mulching of soil proved to conserve approximately 50-60 per cent soil moisture.
2. In solarized soil the temperature increased by over 10-12°C. White transparent and red coloured polyethylene sheeting increased soil temperature more efficiently as compared to black.

Disease-incidence

1. Soil solarization reduced damping-off (pre + post emergence) of cauliflower, by over 40 per cent. Integration with chemical and bioagent seed-treatments further increased effectivity of solarization seed-treatment with apron and BCA's (*Trichoderma harzianum* and *Pseudomonas fluorescens*) were distinctly superior.
2. Black and red polyethylene used for mulching were inferior to white transparent film as incidence of damping-off was higher.
3. Incidence of damping-off of cabbage, raised after cauliflower, too reduced by over 30 per cent. Integration of seed-treatment improved disease controlling potential of solarized soil.
4. Tomato nursery was raised as third crop and incidence of damping-off was reduced but non-significantly.
5. In onion nursery as fourth crop raised in succession, per cent decrease in damping-off incidence was approximately 10-15 per cent over

control.

Growth response

Soil solarization with or without seed-treatment caused significant improvement in health of seedlings raised in nurseries. Improved plant health measured through changes in shoot length, fresh and dry root weight as well as fresh and dry root weight are as follows:

Shoot length

1. Shoot length of cauliflower increased by over 80 per cent while in cabbage the increase was approximately 40-45 per cent. Improvement in shoot length of tomato and onion was marginal or non-significant.

Fresh shoot weight

2. Like other growth parameters, fresh shoot weight of cauliflower increased approximately by over 100 per cent. Improved. Fresh shoot weight of cabbage was approximately 40 per cent but that of tomato was over 100 per cent. Fresh shoot weight of onion increased only marginally.

Dry shoot weight

3. In solarized plots dry shoot weight of cauliflower, cabbage, tomato and onion increased by 110, 86, 15 and 47 per cent, respectively over to that recorded under non-solarized condition.

Fresh root weight

4. Fresh root weight of cauliflower increased approximately by 70 per cent while that of cabbage to the extent of 240 per cent. Fresh root weight of tomato and onion increased by over 70 and 35 per cent, respectively.

Dry root weight

5. Solarization increased dry root weight of cauliflower by over 90 per cent while that of cabbage up to 200 per cent. Similarly dry root weight of tomato and onion also increased substantially.

Soil microflora

1. Populations of fungi declined sharply when estimated after a month's solarization. The reduction ranged from 70 to 80 per cent. 30 days after mulching and raising first nursery, the populations recovered steadily and reduction reached below 50 per cent and then increasing by 20 to 30 per cent.
2. Total fungi recovered almost fully after raising three nursery crops subsequently.
3. Though thickness of the film caused non-significant effect, as variable but colour had significant effect. White and red were distinctly superior over black.
4. Like fungi, total bacteria too, declined sharply after solarization but recovery was much faster than fungi as by 60th days populations increased up to 70 per cent over initial count.
5. The increase in bacterial flora estimated at 120 days showed steady increase and attained more than 88 per cent over its original population indicating suitability of physico-chemical and biological niche for bacterial growth.
6. Similar to fungi and bacteria, counts of naturally occurring counts of *Trichoderma* declined by over 80 per cent immediately solarization. Subsequently crop cultivation helped in recovery of its population

and by 120th day the increase was about 45 per cent over its natural counts.

7. Effect of solarization was drastic on natural populations of *Pythium* species. The recoverable population declined by 95 to 100 per cent. It was only after 90 days that some minor recovery took place but it was non-significant.
8. The PGPR, *Pseudomonas fluorescens* too, declined but not to the magnitude that observed with other microflora. After solarization the reduction was about 50 per cent but by 60th day i.e. after two nurseries the recovery was of high magnitude reaching up to 190 per cent over initial population.
9. Maximum reduction in populations of PGPR was caused by white, followed black and then red [11m. The subsequent increase was however, highest in red followed by black and then white.
10. Solarization reduced populations of *Bacillus* species by over 60 per cent but in subsequent months increased approximately by 60 to 179 per cent over their initial population.

Weed control

1. All the fourteen species of weeds dominated by *Ageratum conjiodes*, *Cynodon*, *Euphorbia*, *Oxalis*, etc. occurring naturally were fully eliminated. However, the control of *C. rotundus* was only 82 per cent. L. White polyethylene lollowed by red and then black was effective in controlling weeds. Thickness of polyethylene as variables were non-significant.

